WGR Trip Due to Firmware Upgrade

Primary Interest Groups
Generator Owners (GO), Generator Operators (GOP)

Overview
On several occasions, a Wind-Generation Resource (WGR) experienced issues with drivetrain oscillations in the ERCOT region.

Details
A Wind-Generating Resource (WGR) reported wind turbine generation trips on four different occasions caused by drivetrain oscillations. The drivetrain oscillations appeared when the total wind plant generation exceeded a certain limit. The cause of the drivetrain oscillations was due to issues with a recent turbine firmware upgrade.

Corrective Actions
1. The Entity created a team of subject matter experts, including the turbine manufacturer, to review the event and create corrective actions.
2. Immediately after the second event, the Entity imposed a curtailment limit based on the previous events.
3. Also following the second event, the Entity worked with the Transmission Operator to create a Temporary Operating Instruction (TOI) to open specific circuit breakers at the wind plant when similar events occur to prevent a significant ramp rate once turbines reset and generation starts.
4. Immediately after the third event, the Entity lowered the curtailment limit since generation at the beginning of this event was below the original limit imposed after the second event. Due to the TOI, the ramp rate after turbines reset was controlled. Additionally, the transmission busses at the WGR substation were split as part of isolating root causes of the generation rampbacks.
5. Following discussions with the turbine manufacturer, the Entity determined that a recent turbine firmware update resulted in the generation trips. The Entity began to revert back to a previous version of the turbine firmware.
6. Following completion of the turbine firmware reset to the previous version, the Entity held a conference call with ERCOT Operations to discuss all events and next steps that were being taken to prevent re-occurrence.
7. Since the turbine firmware was reverted back to a previous version, the WGR units have generated at various output levels, including generation levels at or above self-imposed curtailment limits with no observed problems.

Lessons Learned
1. A complete Change Management process should occur prior to installing turbine firmware. This process of should include procedures for adding, modifying, replacing, or removing turbine hardware or software, and implement supporting configuration management

activities to identify, control and document all entity or vendor-related changes to hardware and software components of the wind turbines pursuant to the change control process.

2. Maintaining open communication channels with ERCOT greatly helped with ensuring that all affected parties have a complete understanding of the events and actions taken to prevent re-occurrence.